

# Claims

- [c1] 1.A system for sonic logging of an earth formation, comprising:  
a logging instrument adapted for disposal within a wellbore traversing the formation;  
at least one acoustic transmitter disposed on the logging instrument;  
at least one receiver adapted to detect acoustic signals disposed on the logging instrument;  
processor means adapted to process acoustic signals to determine a coherence measure from acoustic signals detected by the at least one receiver and associated with the at least one transmitter actuations; and  
processor means adapted to average the coherence measure for a plurality of the at least one transmitter actuations to determine a property of the formation.
- [c2] 2.The system of claim 1 wherein the processor means adapted to process the acoustic signals to determine a coherence measure includes a slowness time coherence calculation.
- [c3] 3.The system of claim 1 wherein the processor means adapted to process the acoustic signals is further adapted to produce a coherence plot from the detected acoustic signals.
- [c4] 4.The system of claim 1 wherein the processor means

adapted to average the coherence measure is further adapted to produce an average coherence plot from the averaged coherence measure.

- [c5] 5.The system of claim 1 wherein the logging instrument is adapted for disposal within the wellbore during the drilling of said wellbore.
- [c6] 6.The system of claim 1 wherein the determined property is the slowness of the formation.
- [c7] 7.A system for sonic logging of an earth formation, comprising:  
a logging instrument adapted for disposal within a wellbore traversing the formation;  
at least one acoustic transmitter disposed on the logging instrument;  
at least one receiver adapted to detect acoustic signals disposed on the logging instrument;  
processor means adapted to process acoustic signals without stacking said signals to determine a coherence measure from acoustic signals detected by the at least one receiver and associated with the at least one transmitter actuations; and  
processor means adapted to average the coherence measure for a plurality of the at least one transmitter actuations to determine a property of the formation.
- [c8] 8.The system of claim 7 wherein the processor means

adapted to process the acoustic signals to determine a coherence measure is adapted to calculate a slowness time coherence.

[c9] 9.The system of claim 7 wherein the processor means adapted to process the acoustic signals is further adapted to produce a coherence plot from the detected acoustic signals.

[c10] 10.The system of claim 7 wherein the processor means adapted to average the coherence measure is further adapted to produce an average coherence plot from the averaged coherence measure.

[c11] 11.The system of claim 7 wherein the logging instrument is adapted for disposal within the wellbore during the drilling of said wellbore.

[c12] 12.The system of claim 7 wherein the determined property is the slowness of the formation.

[c13] 13.A method for sonic logging of an earth formation, comprising:  
(a) repeatedly actuating an acoustic transmitter on a well logging instrument disposed in a wellbore traversing the formation;  
(b) detecting acoustic signals with at least one receiver disposed on the instrument;  
(c) determining a coherence measure from the detected

acoustic signals associated with the at least one transmitter actuations; and

(d) averaging the coherence measure for a plurality of the transmitter actuations to determine a property of the formation.

[c14] 14.The method of claim 13 wherein the determined property is the slowness of the formation.

[c15] 15.The method of claim 13 wherein step (c) includes calculating a slowness time coherence.

[c16] 16.The method of claim 13 wherein step (c) includes producing a coherence plot from the detected acoustic signals.

[c17] 17.The method of claim 13 wherein step (d) includes producing an average coherence plot from the averaged coherence measure.

[c18] 18.The method of claim 13 wherein the logging instrument is adapted for disposal within the wellbore during the drilling of said wellbore.

[c19] 19.A method for sonic logging of an earth formation, comprising:  
(a) repeatedly actuating an acoustic transmitter on a well logging instrument disposed in a wellbore traversing the formation;  
(b) detecting acoustic signals with at least one receiver

disposed on the instrument;

(c) determining a coherence measure from the detected acoustic signals associated with the at least one transmitter actuations without stacking said signals; and

(d) averaging the coherence measure for a plurality of the transmitter actuations to determine the slowness of the formation.